Image

612.34893VV3

1724

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: DULLIEN et al

Serial No.: 09/872,010

Filed: June 4, 2001

For: Process And Device For Eliminating The Particles Contained In A Stream of Fluid

Art Unit: 1724

Examiner: S. Bushey

RESPONSE T0 NOTICE OF DEFECTIVE APPEAL BRIEF

Mail Stop: Appeal Brief
Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

November 18, 2003

Sir:

This is in response to the Notice of Defective Appeal Brief mailed November 10, 2003, in connection with the above-identified application.

Applicants, through their undersigned attorney, are submitting herewith the attached Amended Brief in compliance with the requirements of 37 CFR 1.192(c), i.e., including a concise statement of the issues presented for review with respect to claims 8 and 23 and arguments of appellants with respect to this issue.

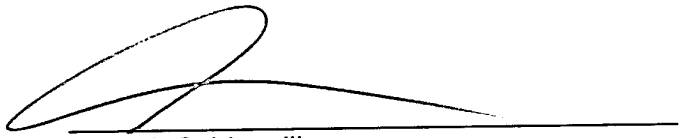
It is noted 37 CFR 1.93(d) provides that, in a case in which the Brief does not comply with the requirements of 37 CFR 1.192(c), appellants will be notified of the reasons for non-compliance and provided with a period of one month within which to file an amended brief. While the Notice of Defective Appeal Brief mailed November 10, 2003 does not specifically set forth a period of one month within which to file the amended brief, the attached amended brief is, in fact, being filed within one month of

the mailing date of the notice of defective appeal brief and, therefore, should be considered timely under 37 CFR 1.192(d) without the need for payment of any extension of time fees.

However, to the extent necessary, appellants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 612.34893VV3), and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



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APPELLANTS' AMENDED BRIEF

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November 18, 2003

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This brief is being submitted in triplicate under 37 CFR 1.192 in connection with the appeal of the final rejection mailed January 31, 2003, a notice of appeal having been filed July 23, 2003.

REAL PARTY IN INTEREST

The real parties in interest are Institut Francais du Petrole of Rueil-Malmaison, France and Francis A.L. Dullien of Ontario, Canada.

RELATED APPEALS AND INTERFERENCES

On information and belief, there is no other appeal or interference known

to appellants, appellants' legal representative or assignees which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

STATUS OF CLAIMS

Claims 5 and 6 have been canceled, leaving claims 1 - 4 and 7 - 23 pending in the application. Claims 11 and 12 stand withdrawn from consideration and the remaining claims, that is, claims 1 - 4, 7 - 10 and 13 - 23 stand finally rejected and are on appeal.

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SUMMARY OF THE INVENTION

The present invention relates to a device and method for eliminating particles contained in a stream of fluid. The device and method of the present invention can be classified as turbulent flow dust or particle removers since they rely on turbulent flow of the fluid stream and turbulent eddies carrying the particles to penetrate into stagnant zones to deposit the particles on the surfaces

of objects forming the stagnant zones adjacent the flow passage. See, e.g., the paragraph bridging pages 1 and 2 of applicants' specification.

During the course of examination, the Examiner has required appellants to elect a single disclosed species for prosecution on the merits. Appellants have elected the species of Figures 6a and 6b. According to this embodiment of the present invention, a fibrous pad, a fibrous mat or a fibrous fabric is disposed along the gas stream. The gas present in the high-porosity pad, mat or fabric forms a dilated viscous boundary layer in which vortices from the turbulent gas stream penetrate and transparent particles in suspension. The particles are trapped by the fibers. While in conventional filters the gas is made to enter on one side of the filter medium and to leave on the other side, bringing about an elevated pressure loss and clogging of the medium, according to the present invention, most of the gas flows along the porous pad, mat or fabric in an open channel, ensuring a stable, high rate of particle recovery, as well as a drop in pressure which remains at a constantly low level, and a high gas flow rate. See, e.g., the paragraph bridging pages 6 and 7 of Appellants' specification and original claim 1.

More specifically, as shown, by way of example only, in Figure 6a and 6b, the present invention uses a container 10 which, in this embodiment, is a tube 10 provided with an inlet 12 for the dust laid-in gas and an outlet 14 for the cleaned gas, equipped with valves 78. Inside tube 10, a fibrous fabric 30 is inserted between two concentric tubes consisting of a grid of medium metal wire or thin metal rods. The tube formed by inner tubular grid 98 constitutes the flow

channel 16. See, Figures 6A and 6B and page 9, line 28 to page 10, line 2 of appellants' specification.

ISSUES

Whether claims 1, 2, 4, 7, 9, 10, 13, 14, 16 - 18, 20 and 21 are patentable under 35 USC 102(b), over published British Patent Specification No. 632,360 (Britain 632,360).

Whether claims 15 and 19 are patentable under 35 USC 103(a) over Britain 632,360.

Whether claims 3 and 22 are patentable under 35 USC 103(a) over Britain 632,360 taken together with United States Patent No. 3,487,610 to Brown et al.

Whether claims 8 and 23 are patentable under 35 USC 103(a) over Britain 632,360 taken together with any one of United States Patent No. 3,545,178 to Sheehan, United States Patent No. 3,808,776 to Jesernig et al, United States Patent No. 3,938,971 to McClure, United States Patent No. 3,955,947 to Hoon et al and United States Patent No. 4,289,630 to Schmidt, Jr. et al.

GROUPING OF CLAIMS

With respect to the rejection of claims 1, 2, 4, 7, 9, 13, 14, 16 - 18, 20 and 21 under 35 USC 102(b), the claims do not stand or fall together. That is, appellants believe the claims to be separately patentable for the reasons set

forth in the arguments section of this brief.

With respect to the rejection of claims 15 and 19 under 35 USC 103(a), the claims of the group do not stand or fall together. That is, appellants believe the claims to be separately patentable for the reasons provided hereinafter in the arguments section of this brief.

With respect to the rejection of claims 3 and 22 under 35 USC 103(a), the claims of the group do not stand or fall together. That is, appellants believe the claims to be separately patentable for the reasons set forth hereinafter in the arguments section of the brief.

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ARGUMENTS

Claims 1, 2, 4, 7, 9, 10, 13, 14, 16 - 18, 20 and 21 are Patentable Under 35 USC 102(b) over Britain 632,360

All of the appealed claims require a flow channel or passage in which the fluid stream flows in turbulent flow. It is submitted the Examiner has not properly interpreted the phrase "turbulent flow" as used in the subject application. During examination, the words of the claims must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ 2d 1320, 1322 (Fed. Cir. 1989). In other words, the

words of the claims must be read as they would be interpreted by those of ordinary skill in the art. Rexnord Corp. v. Laitram Corp., 274 F.3d 1336, 1342, 60 USPQ 2d 1851, 1854 (Fed. Cir. 2001). See, also, Manual of Patent Examining Procedure (MPEP) Section 2111.01. As noted in the McGraw Hill Encyclopedia of Science and Technology, 7th Edition, Volume 18, pages 632-6, a copy of which was attached to the Request for Reconsideration After Final Rejection filed May 17, 2002 and is attached hereto as Exhibit A, turbulent flow is a fluid motion in which velocity, pressure and other flow quantities fluctuate irregularly in time and space. In turbulent flow, eddie patterns are complex and flow quantities (including vorticity) fluctuate randomly in time and three-dimensional space. See, also, the Letter July 3, 2002 from Distinguished Professor Emeritus Dullien to Mr. Jean-Paul Nguyen attached to the Supplemental Response filed December 17, 2002 and also attached hereto as Exhibit B. It is submitted the phrase "turbulent flow" in the claim must be interpreted as those of ordinary skill in the art would interpret the phrase, as evidenced by the definitions provided to the Examiner.

Britain 632,360 discloses separation of solid particles from air or other gases and utilizes a wool-coated surface as a means for retaining separated dust, but specifically discloses that the separator "reduces the turbulence of the air to a minimum." See page 1, lines 31 - 36 of Britain 632,360. See, also, page 3, lines 24 - 33 of this document which indicates that the gas stream entering the channel is substantially void of turbulence. On the other hand, the device and method of the present invention involve the turbulent flow of the fluid stream.

Britain 632,360 teaches away from this aspect of the present invention.

In the Examiner's response in numbered section 9 of the office action to applicant's arguments, the Examiner alleges as follows.

> The British reference teaches throughout that turbulent flow of the fluid stream through the device is the reason the device is capable of separating solid particles from the fluid stream. In fact the two portions of the reference cited by applicant simply emphasize that the turbulence need only be minimal. Please note lines 37-40 on page 1 of the reference, wherein it is stated "that even a small component of velocity at right angles to the general flow will suffice to being a dust particle into contact with the wool." A fluid flow having a component of velocity at right angles to the general flow is in turbulence. Fluid flow is either laminar, i.e., entirely aligned with the general flow direction of the fluid, or turbulent, i.e., flow that while it may include portions that are aligned with the general flow, it also must include portions or a component of velocity at right angles to the general flow, it also must include portions or a component of velocity at right angles to the general flow, as result from the formation of eddies within a fluid stream.

Appellants submit, however, that although Britain 632,360 discusses eddies and vortex flow as possible theories for collecting and retaining dust, the flow in the separator of Britain 632,360 is not "turbulent flow." Turbulent flow is a fluid motion in which velocity, pressure and other flow quantities fluctuate irregularly in time and space. In turbulent flow, eddy patterns are complex and flow quantities (including vorticity) fluctuate randomly in time and three-dimensional space. McGraw Hill Encyclopedia of Science and Technology, 7th Edition, Volume 18, pages 632 - 636. The fact that the inventor of Britain 632,630 theorizes that there may a small component of velocity of right angles to the general flow or eddies or vortex flow, does not necessarily mean that the flow is turbulent flow. That is, the flow is not turbulent flow unless the eddy patterns

are complex and the flow quantities including vorticity, fluctuate randomly in time and space.

The effects of turbulent flow in a precipitator or separator are described in the article by Professor Dullien entitled "Theory and Practice of A New Class of Equipment for Separation of Particulates from Gases; the Turbulent Flow Precipitator"; a copy of Professor Dullien's article was attached to the Request for Reconsideration After Final Rejection filed July 23, 2003, and is also attached hereto as Exhibit C.

For the foregoing reasons, it is submitted the presently claimed invention is not anticipated by over Britain 632,360.

More specifically, independent claim 1 relates to a device for eliminating the particles contained in a stream of fluid. The device includes a container with a flow channel for the fluid stream and turbulent flow and a plurality of objects oriented adjacent the flow channel. The objects have edges communicating with the stream of fluid and defining between them at least on stagnant where the particles are recovered. The objects are comprised of a fibrous pad, a fibrous mat or a fibrous fabric disposed along the gas stream such that the pads, fabrics or fibers furnish additional edges for catching particles. Britain 632,360 does not disclose, inter alia, a container with a flow channel for the fluid stream in turbulent flow. Therefore, Britain 632,360 does not anticipate claim 1.

Britain 632,360 also does not disclose a device for eliminating the particles contained in a stream of fluid including a container with a flow channel for the fluid stream in turbulent flow with objects having edges communicating

with the stream of fluid, the objects being located near each other in a direction other than the direction of flow, as set forth in claim 2,

Britain 632,360 also does not disclose a device for eliminating the particles containing in a stream of fluid including a container with a flow channel for the fluid stream in turbulent flow and in which the turbulent flow is transformed into viscous flow in the spaces, as set forth in claim 4.

Britain 632,360 also does not disclose a device for eliminating the particles contained in a stream of fluid including a container with a flow channel for the fluid stream in turbulent flow and in which the channel is sloped such as to facilitate elimination of the particles collected in the spaces by gravity, as set forth in claim 7.

Britain 632,360 does not disclose a device for eliminating the particles contained in a stream of fluid including a container with a flow channel for the fluid stream in turbulent flow and in which the pad, mat or fibrous fabric defines the flow channel of the fluid stream, as set forth in claim 9.

Britain 632,360 does not disclose a device for eliminating the particles contained in a stream of fluid comprising a container with a flow channel for the fluid stream in turbulent flow, wherein the flow channel is tubular, as set forth in claim 10.

Britain 632,360 also does not disclose a method for elimination of particles contained in a fluid stream with turbulent flow and including penetration of vortices from at least part of the stream into spaces defined between objects disposed near each other and recovery of particles from the surface of the

objects as the vortices damped, as set forth in claim 13.

Britain 632,360 also does not disclose a method for removing particles from a fluid stream including flowing a fluid stream through a flow passage in turbulent flow to allow turbulent eddies to penetrate into the porous, fibrous materials and deposit particles thereon, as set forth in claim 14.

Britain 632,360 does not disclose a method for removing particles from a fluid stream, including flowing the fluid stream through the flow passage and turbulent flow and in which in the perimeter of the flow passage is completely surrounded by the porous fibrous material, as set forth in claim 16.

Britain 632,360 does not disclose a method for removing particles from a fluid stream, including flowing the fluid stream through the flow passage in turbulent flow and in which in the perimeter of the flow passage is completely surrounded by the porous, fibrous material as set forth in claim 16.

Britain 632,360 does not disclose a method for removing particles from a fluid stream, including flowing the fluid stream through the flow passage and turbulent flow and in which in the perimeter of the flow passage is completely surrounded by the porous fibrous material and wherein the flow passage has a tubular shape, as set forth in claim 17.

Britain 632,360 also does not disclose the turbulent flow particle remover set forth in claim 18 including a flow passage through which the fluid stream flow in turbulent flows.

Britain 632,360 also does not disclose a turbulent flow particle remover set forth in claim 18, including a flow passage through which the fluid stream

flows in turbulent flow, the perimeter of the flow passage being completely surrounded by a porous, fibrous material, as set forth in claim 20.

Britain 632,360 also does not disclose a turbulent flow particle remover, including a flow passage through which the fluid stream flows in turbulent flow, the flow passage having a tubular shape, as set forth in claim 21.

For the foregoing reasons, claims 1, 2, 4, 7, 9, 10, 13, 14, 16 - 18, 20 and 21 are not anticipated by Britain 632,360.

Claims 15 and 19 are Patentable Under 35 USC 103(a) Over Britain 632,360

For the reasons noted above, Britain 632,360 does not disclose either a method for removing particles from a fluid stream in turbulent flow or a turbulent flow particle remover including a flow passage through which the fluid stream flows in turbulent flow. Moreover, Britain 632,360 also does not disclose the method set forth in claim 15 wherein the porous fibrous material has a porosity of 90% to 99.9% or the device set forth in claim 19.

The Examiner alleges "it would have been obvious for an artisan at the time of the invention, to arrive at optimal workable porosity levels of the pads of the reference by way of routine experimentation." However, this allegation is not supported by any evidence. The deficiencies of the cited reference cannot be remedied by the Examiner's general conclusions about what is basic knowledge or common sense. In re Lee, 277 F.3d 1338, 1344, 61 USPQ 2d 1430, 1434-5 (Fed. Cir. 2002); In re Zurko, 258 F.3d 1379, 1385, 59 USPQ 2d 1693, 1697 (Fed. Cir. 2001). The Examiner's general conclusion as to what would have been obvious by routine experimentation does not find any corresponding suggestion or motivation in the prior art. Accordingly, claims 15 and 19 are patentable over Britain 632,360.

Claims 3 and 22 are Patentable over Britain 632,360 Taken Together With Brown et al

The Examiner relies on the patent to Brown et al as allegedly disclosing an apparatus for removing particles from a fluid stream similar to that of the British reference but wherein the elements are electrostatically charged.

However, the patent to Brown et al discloses a device quite different than that of Britain 632,360. In Brown et al, the filter comprises a laminated structure of polymeric films having an exceptionally high and stable positive electrostatic charge on one side thereof and a corresponding negative charge at the other. The filter unit of Brown et al apparently relies solely on electrostatic charges to separate the particles from the fluid stream. In view of the differences between Brown et al and the British reference, it is submitted there would have been no motivation to combine the teachings of these documents in the manner urged by the Examiner. Moreover, even assuming, arguendo, one of ordinary skill in the art would have combined the teachings of these documents, it is submitted the Brown et al patent does not remedy any of the basic deficiencies of Britain 632,360.

Thus, the proposed combination of Britain 632,360 and Brown et al would not have suggested the device set forth in claim 3, including the use of objects charged with static electricity having edges communicating with the fluid stream in turbulent flow.

The proposed combination of Britain 632,360 and Brown et al also would not have suggested the turbulent flow particle remover set forth in claim 22, including a flow passage through which the fluid stream flows in turbulent flow, at least a portion of the perimeter of the flow passage being defined by a porous fibrous material charged with static electricity.

For the foregoing reasons, it is submitted claims 3 and 22 are patentable over the proposed combination of Britain 632,360 and Brown et al.

Claims 8 and 23 are patentable under 35 USC 103(a) over Britain 632,360 taken together with any one of Sheenan, Jessernig, McClure, Hoon et al and Schmidt, Jr. et al.

The deficiencies of Britain 632,360 are noted above.

The Sheehan, Jesernig et al, McClure, Hoon et al and Schmidt, Jr. et al patents have been relied upon by the Examiner solely for their alleged teachings of shaker means for periodically shaking filter elements. However, even assuming, arguendo, the secondary references disclose this feature and are combineable with Britain 632,360, even the combined teachings would not have suggested the presently claimed invention. That is, the secondary references do not remedy any of the basic deficiencies of Britain 632,360. Accordingly, claims 8 and 23 is patentable over the proposed combination of references.

Thus, the proposed combination of Britain 632,360 with any of the secondary references would not have suggested the device set forth in claim 8, including a container with a flow channel for the fluid stream in turbulent flow and a plurality of objects oriented adjacent the flow channel, the objects having edges communicating with the stream of fluid and defining between them at least one stagnant space where the particles are recovered, and means for shaking and/or moving the surfaces on which the particles are collected to facilitate their elimination.

The proposed combination of Britain 632,360 and any of the secondary references also would not have suggested the turbulent flow particle remover set forth in claim 23, including a flow passage through which the fluid stream flows in turbulent flow, at least a portion of a parameter of the flow passage being

defined by a porous, fibrous material, and a shaker for shaking the porous, fibrous material and a hopper for collecting particles shaken out of the porous, fibrous material.

CONCLUSION

For the foregoing reasons, the final rejections should be reversed.

A copy of the claims on appeal, i.e., claims 1 - 4, 7 - 10 and 13 - 23 is found in the attached appendix.

To the extent necessary, appellants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, Deposit Account No. 01-2135 (Case: 612.34893VV3), and please credit any excess fees to said deposit account.

Respectfully submitted,

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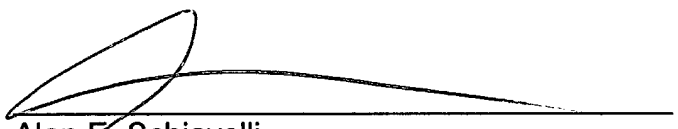

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APPENDIX A

1. Device for eliminating the particles contained in a stream of fluid comprising a container with a flow channel for the fluid stream in turbulent flow and a plurality of objects oriented adjacent the flow channel, said objects having edges communicating with the stream of fluid and defining between them at least one stagnant space where the particles are recovered; characterized in that the objects are comprised of a fibrous pad, a fibrous mat, or a fibrous fabric disposed along the gas stream such that the pads, fabrics, or fibers furnish additional edges for catching particles.

2. Device according to Claim 1, characterized in that said objects are also located near each other in a direction other than the direction of flow.

3. Device according to Claim 1, characterized in that said objects are charged with static electricity.

4. Device according to Claim 1, characterized in that the turbulent flow is transformed into viscous flow in said spaces.

7. Device according to Claim 1, characterized in that the open channel is sloped such as to facilitate elimination of the particles collected in said spaces by gravity.

8. Device according to Claim 1 having means for shaking and/or moving the surfaces on which the particles are collected to facilitate their elimination.

9. Device according to Claim 1, characterized in that the pad, the mat, or the fibrous fabric define the flow channel of the fluid stream.

10. Device according to Claim 1, characterized in that said flow channel is tubular.

13. Method for elimination of particles contained in a fluid stream with turbulent flow, comprising penetration of vortices from at least part of said stream into spaces defined between objects disposed near each other and recovery of said particles from the surfaces of said objects as the vortices are damped.

14. A method for removing particles from a fluid stream, comprising:

providing a flow passage including an inlet and an outlet, at least a portion of a perimeter of the flow passage between the inlet and outlet being defined by a porous, fibrous material; and

flowing the fluid stream through the flow passage in turbulent flow to allow turbulent eddies to penetrate into the porous, fibrous material and deposit particles thereon.

15. The method according to claim 14, wherein the porous fibrous material has a porosity of 90% to 99.9%.

16. The method according to claim 14, wherein the perimeter of the flow passage is completely surrounded by the porous, fibrous material.

17. The method according to claim 16, wherein the flow passage has a tubular shape.

18. A turbulent flow particle remover for removing particles from a fluid stream comprising:

a container including an inlet for allowing a fluid stream in turbulent flow to enter the container and an outlet; and

a flow passage provided between the inlet and the outlet through which the fluid stream flows in turbulent flow, at least a portion of a perimeter of the flow passage being defined by a porous, fibrous material.

19. The device according to claim 18, wherein the porous fibrous material has a porosity of 90% to 99.9%.

20. The device according to claim 18, wherein the perimeter of the flow passage is completely surrounded by the porous, fibrous material.

21. The device according to claim 20, wherein the flow passage has a tubular shape.

22. The device according to claim 18, wherein the porous, fibrous material is charged with static electricity.

23. The device according to claim 18, further comprising a shaker for shaking the porous, fibrous material and a hopper for collecting particles shaken out of the porous, fibrous material.

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More specifically, as shown, by way of example only, in Figure 6a and 6b, the present invention uses a container 10 which, in this embodiment, is a tube 10 provided with an inlet 12 for the dust laid-in gas and an outlet 14 for the cleaned gas, equipped with valves 78. Inside tube 10, a fibrous fabric 30 is inserted between two concentric tubes consisting of a grid of medium metal wire or thin metal rods. The tube formed by inner tubular grid 98 constitutes the flow

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Claims 1, 2, 4, 7, 9, 10, 13, 14, 16 - 18, 20 and 21 are Patentable Under 35 USC 102(b) over Britain 632,360

All of the appealed claims require a flow channel or passage in which the fluid stream flows in turbulent flow. It is submitted the Examiner has not properly interpreted the phrase "turbulent flow" as used in the subject application. During examination, the words of the claims must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ 2d 1320, 1322 (Fed. Cir. 1989). In other words, the

words of the claims must be read as they would be interpreted by those of ordinary skill in the art. Rexnord Corp. v. Laitram Corp., 274 F.3d 1336, 1342, 60 USPQ 2d 1851, 1854 (Fed. Cir. 2001). See, also, Manual of Patent Examining Procedure (MPEP) Section 2111.01. As noted in the McGraw Hill Encyclopedia of Science and Technology, 7th Edition, Volume 18, pages 632-6, a copy of which was attached to the Request for Reconsideration After Final Rejection filed May 17, 2002 and is attached hereto as Exhibit A, turbulent flow is a fluid motion in which velocity, pressure and other flow quantities fluctuate irregularly in time and space. In turbulent flow, eddie patterns are complex and flow quantities (including vorticity) fluctuate randomly in time and three-dimensional space. See, also, the Letter July 3, 2002 from Distinguished Professor Emeritus Dullien to Mr. Jean-Paul Nguyen attached to the Supplemental Response filed December 17, 2002 and also attached hereto as Exhibit B. It is submitted the phrase "turbulent flow" in the claim must be interpreted as those of ordinary skill in the art would interpret the phrase, as evidenced by the definitions provided to the Examiner.

Britain 632,360 discloses separation of solid particles from air or other gases and utilizes a wool-coated surface as a means for retaining separated dust, but specifically discloses that the separator "reduces the turbulence of the air to a minimum." See page 1, lines 31 - 36 of Britain 632,360. See, also, page 3, lines 24 - 33 of this document which indicates that the gas stream entering the channel is substantially void of turbulence. On the other hand, the device and method of the present invention involve the turbulent flow of the fluid stream.

Britain 632,360 teaches away from this aspect of the present invention.

In the Examiner's response in numbered section 9 of the office action to applicant's arguments, the Examiner alleges as follows.

> The British reference teaches throughout that turbulent flow of the fluid stream through the device is the reason the device is capable of separating solid particles from the fluid stream. In fact the two portions of the reference cited by applicant simply emphasize that the turbulence need only be minimal. Please note lines 37-40 on page 1 of the reference, wherein it is stated "that even a small component of velocity at right angles to the general flow will suffice to being a dust particle into contact with the wool." A fluid flow having a component of velocity at right angles to the general flow is in turbulence. Fluid flow is either laminar, i.e., entirely aligned with the general flow direction of the fluid, or turbulent, i.e., flow that while it may include portions that are aligned with the general flow, it also must include portions or a component of velocity at right angles to the general flow, it also must include portions or a component of velocity at right angles to the general flow, as result from the formation of eddies within a fluid stream.

Appellants submit, however, that although Britain 632,360 discusses eddies and vortex flow as possible theories for collecting and retaining dust, the flow in the separator of Britain 632,360 is not "turbulent flow." Turbulent flow is a fluid motion in which velocity, pressure and other flow quantities fluctuate irregularly in time and space. In turbulent flow, eddy patterns are complex and flow quantities (including vorticity) fluctuate randomly in time and three-dimensional space. McGraw Hill Encyclopedia of Science and Technology, 7th Edition, Volume 18, pages 632 - 636. The fact that the inventor of Britain 632,630 theorizes that there may a small component of velocity of right angles to the general flow or eddies or vortex flow, does not necessarily mean that the flow is turbulent flow. That is, the flow is not turbulent flow unless the eddy patterns

are complex and the flow quantities including vorticity, fluctuate randomly in time and space.

The effects of turbulent flow in a precipitator or separator are described in the article by Professor Dullien entitled "Theory and Practice of A New Class of Equipment for Separation of Particulates from Gases; the Turbulent Flow Precipitator"; a copy of Professor Dullien's article was attached to the Request for Reconsideration After Final Rejection filed July 23, 2003, and is also attached hereto as Exhibit C.

For the foregoing reasons, it is submitted the presently claimed invention is not anticipated by over Britain 632,360.

More specifically, independent claim 1 relates to a device for eliminating the particles contained in a stream of fluid. The device includes a container with a flow channel for the fluid stream and turbulent flow and a plurality of objects oriented adjacent the flow channel. The objects have edges communicating with the stream of fluid and defining between them at least on stagnant where the particles are recovered. The objects are comprised of a fibrous pad, a fibrous mat or a fibrous fabric disposed along the gas stream such that the pads, fabrics or fibers furnish additional edges for catching particles. Britain 632,360 does not disclose, inter alia, a container with a flow channel for the fluid stream in turbulent flow. Therefore, Britain 632,360 does not anticipate claim 1.

Britain 632,360 also does not disclose a device for eliminating the particles contained in a stream of fluid including a container with a flow channel for the fluid stream in turbulent flow with objects having edges communicating

with the stream of fluid, the objects being located near each other in a direction other than the direction of flow, as set forth in claim 2,

Britain 632,360 also does not disclose a device for eliminating the particles containing in a stream of fluid including a container with a flow channel for the fluid stream in turbulent flow and in which the turbulent flow is transformed into viscous flow in the spaces, as set forth in claim 4.

Britain 632,360 also does not disclose a device for eliminating the particles contained in a stream of fluid including a container with a flow channel for the fluid stream in turbulent flow and in which the channel is sloped such as to facilitate elimination of the particles collected in the spaces by gravity, as set forth in claim 7.

Britain 632,360 does not disclose a device for eliminating the particles contained in a stream of fluid including a container with a flow channel for the fluid stream in turbulent flow and in which the pad, mat or fibrous fabric defines the flow channel of the fluid stream, as set forth in claim 9.

Britain 632,360 does not disclose a device for eliminating the particles contained in a stream of fluid comprising a container with a flow channel for the fluid stream in turbulent flow, wherein the flow channel is tubular, as set forth in claim 10.

Britain 632,360 also does not disclose a method for elimination of particles contained in a fluid stream with turbulent flow and including penetration of vortices from at least part of the stream into spaces defined between objects disposed near each other and recovery of particles from the surface of the

objects as the vortices damped, as set forth in claim 13.

Britain 632,360 also does not disclose a method for removing particles from a fluid stream including flowing a fluid stream through a flow passage in turbulent flow to allow turbulent eddies to penetrate into the porous, fibrous materials and deposit particles thereon, as set forth in claim 14.

Britain 632,360 does not disclose a method for removing particles from a fluid stream, including flowing the fluid stream through the flow passage and turbulent flow and in which in the perimeter of the flow passage is completely surrounded by the porous fibrous material, as set forth in claim 16.

Britain 632,360 does not disclose a method for removing particles from a fluid stream, including flowing the fluid stream through the flow passage in turbulent flow and in which in the perimeter of the flow passage is completely surrounded by the porous, fibrous material as set forth in claim 16.

Britain 632,360 does not disclose a method for removing particles from a fluid stream, including flowing the fluid stream through the flow passage and turbulent flow and in which in the perimeter of the flow passage is completely surrounded by the porous fibrous material and wherein the flow passage has a tubular shape, as set forth in claim 17.

Britain 632,360 also does not disclose the turbulent flow particle remover set forth in claim 18 including a flow passage through which the fluid stream flow in turbulent flows.

Britain 632,360 also does not disclose a turbulent flow particle remover set forth in claim 18, including a flow passage through which the fluid stream

flows in turbulent flow, the perimeter of the flow passage being completely surrounded by a porous, fibrous material, as set forth in claim 20.

Britain 632,360 also does not disclose a turbulent flow particle remover, including a flow passage through which the fluid stream flows in turbulent flow, the flow passage having a tubular shape, as set forth in claim 21.

For the foregoing reasons, claims 1, 2, 4, 7, 9, 10, 13, 14, 16 - 18, 20 and 21 are not anticipated by Britain 632,360.

Claims 15 and 19 are Patentable Under 35 USC 103(a) Over Britain 632,360

For the reasons noted above, Britain 632,360 does not disclose either a method for removing particles from a fluid stream in turbulent flow or a turbulent flow particle remover including a flow passage through which the fluid stream flows in turbulent flow. Moreover, Britain 632,360 also does not disclose the method set forth in claim 15 wherein the porous fibrous material has a porosity of 90% to 99.9% or the device set forth in claim 19.

The Examiner alleges "it would have been obvious for an artisan at the time of the invention, to arrive at optimal workable porosity levels of the pads of the reference by way of routine experimentation." However, this allegation is not supported by any evidence. The deficiencies of the cited reference cannot be remedied by the Examiner's general conclusions about what is basic knowledge or common sense. In re Lee, 277 F.3d 1338, 1344, 61 USPQ 2d 1430, 1434-5 (Fed. Cir. 2002); In re Zurko, 258 F.3d 1379, 1385, 59 USPQ 2d 1693, 1697 (Fed. Cir. 2001). The Examiner's general conclusion as to what would have been obvious by routine experimentation does not find any corresponding suggestion or motivation in the prior art. Accordingly, claims 15 and 19 are patentable over Britain 632,360.

Claims 3 and 22 are Patentable over Britain 632,360 Taken Together With Brown et al

The Examiner relies on the patent to Brown et al as allegedly disclosing an apparatus for removing particles from a fluid stream similar to that of the British reference but wherein the elements are electrostatically charged.

However, the patent to Brown et al discloses a device quite different than that of Britain 632,360. In Brown et al, the filter comprises a laminated structure of polymeric films having an exceptionally high and stable positive electrostatic charge on one side thereof and a corresponding negative charge at the other. The filter unit of Brown et al apparently relies solely on electrostatic charges to separate the particles from the fluid stream. In view of the differences between Brown et al and the British reference, it is submitted there would have been no motivation to combine the teachings of these documents in the manner urged by the Examiner. Moreover, even assuming, arguendo, one of ordinary skill in the art would have combined the teachings of these documents, it is submitted the Brown et al patent does not remedy any of the basic deficiencies of Britain 632,360.

Thus, the proposed combination of Britain 632,360 and Brown et al would not have suggested the device set forth in claim 3, including the use of objects charged with static electricity having edges communicating with the fluid stream in turbulent flow.

The proposed combination of Britain 632,360 and Brown et al also would not have suggested the turbulent flow particle remover set forth in claim 22, including a flow passage through which the fluid stream flows in turbulent flow, at least a portion of the perimeter of the flow passage being defined by a porous fibrous material charged with static electricity.

For the foregoing reasons, it is submitted claims 3 and 22 are patentable over the proposed combination of Britain 632,360 and Brown et al.

Claims 8 and 23 are patentable under 35 USC 103(a) over Britain 632,360 taken together with any one of Sheenan, Jessernig, McClure, Hoon et al and Schmidt, Jr. et al.

The deficiencies of Britain 632,360 are noted above.

The Sheehan, Jesernig et al, McClure, Hoon et al and Schmidt, Jr. et al patents have been relied upon by the Examiner solely for their alleged teachings of shaker means for periodically shaking filter elements. However, even assuming, arguendo, the secondary references disclose this feature and are combineable with Britain 632,360, even the combined teachings would not have suggested the presently claimed invention. That is, the secondary references do not remedy any of the basic deficiencies of Britain 632,360. Accordingly, claims 8 and 23 is patentable over the proposed combination of references.

Thus, the proposed combination of Britain 632,360 with any of the secondary references would not have suggested the device set forth in claim 8, including a container with a flow channel for the fluid stream in turbulent flow and a plurality of objects oriented adjacent the flow channel, the objects having edges communicating with the stream of fluid and defining between them at least one stagnant space where the particles are recovered, and means for shaking and/or moving the surfaces on which the particles are collected to facilitate their elimination.

The proposed combination of Britain 632,360 and any of the secondary references also would not have suggested the turbulent flow particle remover set forth in claim 23, including a flow passage through which the fluid stream flows in turbulent flow, at least a portion of a parameter of the flow passage being

defined by a porous, fibrous material, and a shaker for shaking the porous, fibrous material and a hopper for collecting particles shaken out of the porous, fibrous material.

CONCLUSION

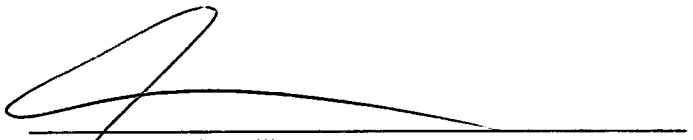
For the foregoing reasons, the final rejections should be reversed.

A copy of the claims on appeal, i.e., claims 1 - 4, 7 - 10 and 13 - 23 is found in the attached appendix.

To the extent necessary, appellants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, Deposit Account No. 01-2135 (Case: 612.34893VV3), and please credit any excess fees to said deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



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APPENDIX A

1. Device for eliminating the particles contained in a stream of fluid comprising a container with a flow channel for the fluid stream in turbulent flow and a plurality of objects oriented adjacent the flow channel, said objects having edges communicating with the stream of fluid and defining between them at least one stagnant space where the particles are recovered; characterized in that the objects are comprised of a fibrous pad, a fibrous mat, or a fibrous fabric disposed along the gas stream such that the pads, fabrics, or fibers furnish additional edges for catching particles.

2. Device according to Claim 1, characterized in that said objects are also located near each other in a direction other than the direction of flow.

3. Device according to Claim 1, characterized in that said objects are charged with static electricity.

4. Device according to Claim 1, characterized in that the turbulent flow is transformed into viscous flow in said spaces.

7. Device according to Claim 1, characterized in that the open channel is sloped such as to facilitate elimination of the particles collected in said spaces by gravity.

8. Device according to Claim 1 having means for shaking and/or moving the surfaces on which the particles are collected to facilitate their elimination.

9. Device according to Claim 1, characterized in that the pad, the mat, or the fibrous fabric define the flow channel of the fluid stream.

10. Device according to Claim 1, characterized in that said flow channel is tubular.

13. Method for elimination of particles contained in a fluid stream with turbulent flow, comprising penetration of vortices from at least part of said stream into spaces defined between objects disposed near each other and recovery of said particles from the surfaces of said objects as the vortices are damped.

14. A method for removing particles from a fluid stream, comprising:

providing a flow passage including an inlet and an outlet, at least a portion of a perimeter of the flow passage between the inlet and outlet being defined by a porous, fibrous material; and

flowing the fluid stream through the flow passage in turbulent flow to allow turbulent eddies to penetrate into the porous, fibrous material and deposit particles thereon.

15. The method according to claim 14, wherein the porous fibrous material has a porosity of 90% to 99.9%.

16. The method according to claim 14, wherein the perimeter of the flow passage is completely surrounded by the porous, fibrous material.

17. The method according to claim 16, wherein the flow passage has a tubular shape.

18. A turbulent flow particle remover for removing particles from a fluid stream comprising:

a container including an inlet for allowing a fluid stream in turbulent flow to enter the container and an outlet; and

a flow passage provided between the inlet and the outlet through which the fluid stream flows in turbulent flow, at least a portion of a perimeter of the flow passage being defined by a porous, fibrous material.

19. The device according to claim 18, wherein the porous fibrous material has a porosity of 90% to 99.9%.

20. The device according to claim 18, wherein the perimeter of the flow passage is completely surrounded by the porous, fibrous material.

21. The device according to claim 20, wherein the flow passage has a tubular shape.

22. The device according to claim 18, wherein the porous, fibrous material is charged with static electricity.

23. The device according to claim 18, further comprising a shaker for shaking the porous, fibrous material and a hopper for collecting particles shaken out of the porous, fibrous material.